

# **PSYCHIATRIC CO-MORBIDITIES IN PATIENTS WITH LONG - STANDING DIABETES MELLITUS**

## **ABSTRACT :**

Diabetes mellitus has been described as the most complex and demanding of any chronic disease to manage. WHO estimates about 350 million people to be affected by diabetes mellitus world wide by the year 2030, which is more than double from year 2000. Among various co-morbidities associated with diabetes, psychiatric manifestations form a major subset. Evidences of depression and anxiety among other psychiatric disorders being common in patients with diabetes mellitus. Such co-morbidities being undetected or undertreated has shown impact on general well being as a result of poorer quality of life.

## **AIM :**

To estimate the prevalence of psychiatric co-morbidities in patients with diabetes mellitus and to assess their quality of life.

## **METHODOLOGY :**

Patients attending diabetology out patient department with a diagnosis of diabetes mellitus were evaluated for psychiatric disorders using Mini International Neuropsychiatric Interview (M.I.N.I) and was also assessed for quality of life with world Health Organization Quality Of Life- BREF scale (WHOQOL-BREF).

## **RESULTS :**

Out of the study sample comprising of 50 diabetic individuals, 8 % (n=4) had psychiatric co morbidities based on M.I.N.I. of which 4 % (n=2) were found to have Major Depressive episode with melancholia, 2 % (n=1) had only Major depressive episode and another 2 % (n=1) had dysthymia. In terms of quality of life as assessed by WHOQOL-BREF the physical and psychological health domains showed a significant association with post prandial blood sugar levels ( $P=0.004$ ) and ( $P=0.017$ ) respectively. In addition co-existing dyslipidemia showed a significant association ( $P=0.018$ ) with quality of life in the environmental domain.

## **CONCLUSION :**

This study with a smaller sample size reveals the presence of psychiatric co-morbidities among individuals with long standing diabetes mellitus and a negative impact on the health related quality of life. However future researches on a larger sample might yield a better prevalence which would help to assess the burden of psychiatric co morbidities due to long standing diabetes mellitus and the ensuing negative impact on quality of life. Such assessments could help improve mental well being and the overall quality of life.

**Keywords :** Diabetes Mellitus, Psychiatric co-morbidities, Quality of life, Adherence

## **INTRODUCTION:**

Diabetes Mellitus is a chronic and heterogeneous metabolic disorder, defined as a ~~metabolic abnormality~~ characterised by hyperglycaemia and disturbances of carbohydrate, fat and protein metabolism that are associated with absolute or relative deficiency in insulin secretion and/or insulin action<sup>1</sup>. Diabetes mellitus has also been described as the "most complex and demanding" of any chronic disease to manage.

The scourge of diabetes has always followed a rising trend resulting in an increased prevalence in all the six inhabited continents across the globe (36). Diabetes mellitus is projected to affect Asian Indians most among all others in the world by 2025 (1, 2) . The World Health Organisation has estimated that around 350 million people to be affected by diabetes mellitus by the year 2030, which is more than double from 2000 (17) .

By affecting a huge population, Diabetes Mellitus poses a tremendous health, social, mental and economic burden globally. In the last 3 decades the diabetic status has changed from being a mild disorder

of the elderly population to a major cause of morbidity and mortality even among the youth and middle aged population. The prevalence of type I diabetes is also increasing yet the major contributor to the epidemic is the more common type 2 diabetes that accounts for more than 90 percent of all diabetic cases(37) .

Being home to more than 65.1 million diabetic patients in 2013 (3) , India was termed as approaching towards the –Diabetic Capital of the Worldll (4) . The prevalence of diabetes in the southern part of India was found to be higher -13.5% among Chennai residents, in Bangalore, 12.4% and Hyderabad,16.6% than eastern India, 11.7% (Kolkata), northern India, 11.6% (New Delhi) and western India, 9.3% (Mumbai) as per the National Urban Diabetes Survey (NUDS) (5,6). Among all cities in India, Chennai is the only region which has had repeated well-conducted epidemiological studies on prevalence of diabetes in the last two decades (37) .

According to Misra and colleagues (38) , migration from rural areas to urban slums in a metropolitan city in India was found to predispose to obesity, glucose intolerance, and dyslipidaemia.

The chronic nature of diabetes increases the possibility for developing various co-morbidities. Among them psychiatric illnesses form an important subset. The experience of living with diabetes is an ongoing dialog process with one's own self and the world, associated with damaged identity of the individual due to destruction of different aspects of life.

Diabetes mellitus is behaviourally demanding making fast and radical lifestyle modification a necessity. Such rapid changes result in many problems for both the individual and their family. The demands of self care in diabetes are constant with no relaxation of rules. The emotional and psychological facets of this chronic medical condition is often paid less attention to, when medical management is taken into consideration.

Depression and anxiety are the two most common co morbid conditions associated with diabetes mellitus (8) . A prevalence study on community and hospital based samples showed depression as commonly associated with diabetes mellitus (18,19) . Depression may be especially

prevalent in people with diabetes (68-71 ) and diabetes doubles the risk of co morbid depression(72).

Anxiety disorders associated with diabetes mellitus has resulted in less favourable glycemic control, where in a systemic review has shown 40% of subjects with diabetes mellitus to have elevated anxiety symptoms and among which generalized anxiety disorder was found in as many as 14% of patients with diabetes mellitus (20) , higher in those with type 2 (73) . Anxiety is a risk factor for poor glycemic control (74) .

A large New York city study reported serious psychological distress in the form of depression, anxiety and other disorders in 10.4% of persons with diabetes (39) . Nonetheless morbidity due to mental disorders in India are comparable to global rates (40) .


A meta-analysis carried out by Reddy and Chandrasekhar included 13 studies on epidemiology of psychiatric disorder recruiting 33572 subjects from the community revealed a prevalence of depression to be 7.9 to 8.9 per thousand population and the prevalence rates were nearly twice in the urban areas (9) .

In rural north an epidemiological study revealed that psychiatric morbidity was more common in the elderly age group (43.32%) in comparison to the population below 60 years of age (41) . According to a hospital based survey in New Delhi, nearly one third of 209 subjects above 60 years suffered from a psychiatric illness (42) .

However such Psychiatric co-morbidities are often undetected, hence undertreated or in some cases left untreated . Such unattended psychiatric illnesses are associated with still higher rates of morbidity and even mortality. The likelihood of co-existence of psychiatric morbidity and diabetes may worsen the other.

Risk factors for development of depression in individuals with diabetes are:

 Female sex

 Adolescent/Young adults and older adults.

 Poverty

 Poor glycemic control, particularly with recurrent hypoglycemia.

 Longer duration of diabetes.

 Presence of long -term complications (49,50,51,52,53) .



Risk factors for depression in diabetes mellitus: type 2 diabetes mellitus, particularly for women and socioeconomically disadvantaged people (75) .

Prevalence rates of both depression and anxiety consistently higher in women than men ( 73,74) .The prevalence of depression was 8%–52% in Type 2 diabetes mellitus (76) , 12% in Type 1 ( 77) .

A study estimated that 14% of diabetics had generalized anxiety disorder, while twice the number had subclinical anxiety and triple the number with at least some symptoms of anxiety (54) .Eating disorders - anorexia nervosa , bulimia nervosa and binge eating was found to be more prevalent in diabetic individuals when compared to general population (55,56) .

Night Eating Syndrome (NES) observed in type 2 diabetes mellitus patients with depressive symptoms wherein >25% of daily intake of calories is consumed after dinner and waking from sleep to eat for at least thrice a week. Night eating syndrome can result in weight gain, poor glycemic control and increase in diabetes related complications (57) .

The Rotterdam study, a large prospective study concluded that patients with diabetes mellitus especially those treated with insulin were more prone to develop dementia including Alzheimer's disease (58) .

Studies show higher risk of suicide among diabetic patients than the general population with rates of suicidal ideation as high as 26.4% (59) and rates of suicidal attempts as high as 13.3% (60) .On the contrary, two studies showed that patients with diabetes had lower rate of suicidal ideation when compared with healthy controls (61) and patients with other medical conditions (62) .

Quality of life (QOL), as per Emerson is defined as –The satisfaction of an individual's values, goals and needs through actualization of their abilities or lifestyle. Living with Diabetes Mellitus reduces Health Related Quality of Life (HRQoL). Quality of life is affected psychologically in terms of social withdrawal, feelings of loneliness, guilt, hopelessness and in the worse scenario, even suicidal intentions do prevail. Hence Quality of life forms an important predictor of overall, multi morbidity approach diabetic care.

The International Diabetic Federation found Quality of life to be one of the basic goals of diabetes cure, equal to metabolic compensation and prevention of development of chronic complications (14) . A long lasting disease-related suffering becomes a part of patients life and therefore it is important to evaluate Quality of life from the perspective of the disease.

Similarly the European Diabetes Policy (1998/1999) concluded that the most important goal in the treatment would be ensuring for diabetic patients life span and quality of life comparable with the healthy population (15) .

These long term goals would be accomplished by reaching the short term goal which is the metabolic control of glucose. According to Nadeau et al., regular control of glycemic levels, patient's education and visits in diabetology clinics correlate with improvement in quality of life (16) .

Gender differences were observed with respect to well being wherein men reported better adjustment in the domains of coping and

integration of illness and women with type 2 diabetes mellitus had poorer quality of life compared to men (43) .

Among type 2 diabetic patients Short Form 36 (SF36) Health survey and Diabetes Quality of Life (DQOL) when administered brought to light that patients on insulin reported a poor quality of life in comparison to other type 2 diabetics who were not on insulin (63).

With regard to Quality of life and duration of diabetes mellitus, some studies reported a decrease in quality of life with increase in duration (64) on the other hand some reported no significance between duration of diabetes and quality of life (65) .

While a curvilinear relationship between Quality of life and HbA1c was suggested by 1 group of authors who used Swedish Quality of Life Scale(SWEDQUAL) (66) another group of authors who administered SF-36 explicitly objected the suggestion stating that there was no linear or curvilinear relationship between HbA1c and quality of life (67) .

In teaching hospitals, physicians and surgeons may underestimate the occurrence of psychiatric morbidity in regular practice (45) . Also recognition of depression in clinical practice is overlooked as the illness becomes chronic and severe, common mental disorders undergo transition from somatic to psychological.

In addition depression is considered as a "normal consequence of difficult medical illness"(46) . However denial, anxiety and depression could compromise with the coping skills to diabetes mellitus (47) .

Under diagnosed and hence poorly managed Psychiatric Illnesses result in ineffective medical services with futile attempts in restoring Quality of Life, further adding to the economic burden and also resulting in development of complications. In every chronic disease, the greatest influence on patient's quality of life is caused by fear of appearance of complications.

The more severe the complications with more sensible effects, lower is the quality of life. Inadequate control of diabetes might cause or aggravate depression via direct effects on brain functions or indirectly

through complications, functional impairment or poor quality of life (48) . Identification of depressive symptoms is crucial as depression by itself is a risk factor for poor self management of diabetes and various outcomes of at most importance being early mortality.

Hence early identification and treating common psychiatric co-morbidities like depressive disorder and counselling for psychological stress would improve both the well-being and metabolic control in diabetes mellitus (44) . Treatment of depression in diabetic individuals is important for alleviation of the psychiatric condition as it is associated with poor glucose regulation (78-81) and decreased adherence to the treatment regimen (82,83) . Depression is associated with poor adherence to treatment recommendations and poorer outcomes (75,84,85) .

In diabetics, Quality of life can be improved by some interventions such as introducing Anti-Diabetic agents, changes in insulin delivery systems and education and counselling to develop diabetes-specific coping skills. Pervasive impact of depression on quality of life and its potential negative effect on diabetes management requires recognition and treatment of the affective disorder in diabetic individuals (86).

## **RATIONALE OF OUR STUDY :**

While Diabetes Mellitus is well recognised in India as a common disorder it is less noted that psychiatric co-morbidities are not uncommon. Since early detection of psychiatric co-morbidities and implementation of clinical interventions could make a huge difference in terms of both mental well being and Quality of life , we decided to do this study to assess the presence of various psychiatric co-morbidities and resulting quality of life.

## **REVIEW OF LITERATURE:**

Von koff et al (17), had conducted a study involving 18 surveys in 17 countries including Europe, America, Middle East, Africa, Asia and South Pacific. This was the largest study including a sample size of 85,088 Diabetes mellitus participants for whom face to face interview was carried out. World Health Composite International Diagnostic Interview was used to assess mental disorders, which estimated odd's ratio of 1.38 for depression and 1.20 for anxiety disorders.

Gagnon et al (21) have shown evidence suggesting a prevalence of eating disorders in a cross-sectional study comprising 140 people diagnosed with type 2 Diabetes mellitus.

Micheal Lucas et al (35) carried out a bidirectional study between depression and type 2 diabetes mellitus among women. In this study 65,831 women aged between 50 to 75 years were observed for a time frame of 1996 to 2000. After exclusion of subjects with prior diagnosis of depression, on the remaining 25,857 subjects further analysis to investigate effect of depression with various diabetic management



strategies such as without medication, with oral hypoglycemics or with insulin therapy.

By the end of 10 year follow up, 7415 cases of clinical depression were identified to have a Relative Risk of 1.44 in age adjusted model when compared to the non-diabetic arm. Relative Risk of developing depression in comparison to diabetic individuals without medications, with oral hypoglycemics and with insulin therapy was 1.36, 1.42 and 1.78 respectively. These remained significant even after adjustment for co-variates.

Ford et al (34) performed a study in the year 2007 at United States of America recruiting 21,766 subjects and estimated the level of under treatment of mental health problems and serious psychological distress in patients with diabetes mellitus which was about 8.3 +/- 0.1 %.

The estimated prevalence of total serious psychological distress and undertreated serious psychological distress in total population, among subjects with Diabetes Mellitus and among subjects without Diabetes

Mellitus turned out to be 3.9 +/- 0.1 % and 2.1 +/- 0.1 % ; 7.6 +/- 0.4 % and 3.4 +/- 0.3% ; 3.6 +/- 0.1 % and 2.0 +/- 0.1 % respectively.

Among subjects with both Diabetes Mellitus and Serious Psychological distress the prevalence of receiving no treatment for mental health problems were 45.0 % when compared to 54.9 % among people without Diabetes Mellitus.

A meta-analysis performed by Anderson et al (19) on prevalence of depression in diabetic adults, which included 42 studies in which 20 were controlled and 22 were uncontrolled studies.

Controlled studies showed Odd's ratio of 2.0 for depression which was twice that of the non-diabetic group, however with no difference in accordance to type of diabetes mellitus.

Prevalence of co morbid depression was significantly higher among diabetic women with an estimate of 28 % more than that among diabetic men with an estimate of 18 %.

Uncontrolled studies had a higher prevalence of 30 % in comparison to 21 % of controlled studies and 32 % in clinical samples in comparison to 20 % of community samples.

Robert D et al (33) reported prevalence of depression in diabetic population as 24 % in comparison to 17 % in non diabetic population. Health Related Quality of Life (HRQoL) questionnaire revealed a larger impact on all dimensions of quality of life among subjects with diabetes as well as co morbid depression when compared to the non-diabetic arm.

A multicentre study carried by Herpetz et al (31) to investigate the relation between weight and eating disorders in a sample of type 2 diabetes mellitus patients.

This multicentre study recruited 321 participants, out of whom 81 % were overweight or obese among whom the prevalence of eating disorder ranged from 6.5 % to 9 % with the most common eating disorder found to be Binge eating.

This has shown evidence of strong correlation between increased Body Mass Index and eating related psychological distress, where as Eating disorder syndrome in type 2 diabetes mellitus had considerable depressive symptoms.

Peters JL et al (12) conducted a systematic review of literature to estimate the prevalence and odds ratio of depression in type 2 diabetes mellitus in comparison to those without diabetes mellitus.

10 control studies were taken into consideration that included 51,331 subjects. The prevalence of depression in subjects with type 2 diabetes mellitus was much higher 17.6 % when compared to the non-diabetic arm 9.8 % with Odds ratio of 1.6.

Among subjects with depression and type 2 diabetes mellitus, females have higher prevalence of 23.8 % compared to males of 12.8 % .

In a retrospective population-based study among 4385 patients with DM conducted by Katon et al, an inadequate rate of correct

recognition of depression (51%) over a 12-month period prior to the study was recognised.

In addition, only 31% of the patients correctly diagnosed with depression received adequate dosage of antidepressants and only 6.7% of them received an adequate amount (defined as  $\geq 4$ ) of psychotherapy sessions over the 12-month period (10) .

Diabetes Mellitus that is co morbid with anxiety or depression results in poor metabolic control, higher complication rates, increased management costs, disability leading to poor quality of life and increased mortality rates (11,13).

Anderson et al (20) , had performed a systematic review on existing literatures to estimate the prevalence of anxiety in adults with diabetes mellitus. They included 18 studies including 2584 participants with diabetes and 1492 as controls.

Estimated data revealed 14% of diabetic individuals with a diagnosis of generalized anxiety disorders, 27% of diabetic individuals diagnosed with anxiety disorders – not otherwise specified and elevated anxiety symptoms in 40% of diabetic individuals. Women had significantly higher prevalence of 55.3% when compared with men of 32.9% with a P value of less than 0.0001.

Bhattacharya et al (24) have assessed the correlation between treatment of depression in patients with type 2 diabetes mellitus in relation to health care expenditures. It was a retrospective longitudinal cohort design implemented on the literature search between 2000 – 2008. Sample size was 5295, in which 25.2 % were aged between 18 and 44 years; 36.3 % between 45 and 54 years; 38.5 % between 55 and 64 years of age.

Study revealed a result of 16 % reduction in health care expenditure among the treatment with anti-depressant only group, 22 % reduction in expenses for healthcare among anti-depressant and psychotherapy combined group when comparison was made with the no depression treatment group.

In a cross-sectional population-based study by Kruse et al (86), among 141 patients with diabetes mellitus identified out of a community sample of 4169 individuals, the prevalence of any mental disorder assessed with Composite International Diagnostic Interview (CIDI) was comparable between the patients with diabetes mellitus and non diabetic individuals such as 26.6% vs 26% respectively with an odds ratio of 1.11 and confidence interval of 0.73 to 1.69. Concerning affective, somatoform, substance abuse /dependence disorders; only anxiety disorders were found to be significantly prevalent in diabetic group with odds ratio of 2.05.

Das-Munshi et al (87) in another cross-sectional population-based study of 249 patients with diabetes mellitus who were identified out of a sample of 8580 individuals, reported a prevalence of any mental disorder-assessed with the Clinical Interview Schedule-Revised (CIS-R), was 21.6% in diabetic group vs 16.3% in non-diabetic group.

The odds ratio was 1.3, which was insignificant even after adjusting for impairment in daily functioning and medical co-morbidity. The same pattern also applied to mixed anxiety and depression, resulting

in odds ratio being statistically insignificant with respect to depression, anxiety and co-morbid depressive and anxiety symptoms.

Janet et al (88) performed a cross-sectional design conducted among primary care patients diagnosed with type 2 diabetes, hypertension, arthritis, and asthma, as well as to those with no chronic illness, the 12-month prevalence of depressive and anxiety disorders was assessed. This design showed a high prevalence of depression or anxiety disorders (36%) among those with diabetes in comparison to any other chronic illness. Type 2 diabetes may serve as an indicator of depression and anxiety in low-income adults treated in primary care clinics.

Arthur et al (89), conducted a cross-sectional observational study of 110 diabetic outpatients (mean = 58.3, SD = 14.5; 50 male and 60 female) was conducted in a public health clinic with patients diagnosed with diabetes mellitus who were under the medical supervision of an endocrinologist.

The patients were evaluated through the Mini International Neuropsychiatric Interview (M.I.N.I.) and the Hospital Anxiety and Depression Scale (HADS). Anxiety symptoms were found in 60 % (n =



66) and depression symptoms were found in 53.6 % (n = 59) , 28.2% (n = 31) of patients without depression or anxiety, 13.6% (n = 15) of patients with depression.

In the study population the prevalence of various psychiatric disorders were generalized anxiety disorder (22.7%), dysthymia (18.2%), panic disorder (8.2%) and social phobia (5.5%).


Igwe M.N.et al (62) had conducted a study at the endocrinology and cardiology clinic of University of Nigeria Teaching hospital, Enugu. 270 subjects meeting inclusion criteria were recruited in the study. Subjects were between 18 to 64 years of age. Study was carried out for a period of 6 months between August 2010 and January 2011.


M.I.N.I was administered to the study group. Among subjects with diabetes mellitus rate of depression was 27.8 % and suicidal behaviour was exhibited by 17 (6.3 %) of subjects. Suicidal risk was higher in patients with diabetes mellitus with an estimate of 3 (1.1%) subjects scoring high on suicidal module of M.I.N.I.


It was found that non-married diabetic subjects were more likely to have depression than married subjects (  $X^2=11.41$ ,  $P < 0.001$  ). The study

also revealed that of the female subjects with diabetes mellitus 8 ( 6.4 % )  
had suicidal behavior comparison to 9 ( 6.2% ) male subjects with  
suicidal behaviour ( $X^2 = 0.00$ ,  $P = 0.95$ ).

## **AIMS AND OBJECTIVES :**

 To find the prevalence of psychiatric co-morbidities in a group of patients with long standing diabetes mellitus attending diabetology out patient department.

 To study the relationship between psychiatric co-morbidities in individuals with diabetes mellitus and quality of life.

 To study the relationship between psychiatric co-morbidities and various clinical and treatment factors associated with diabetes.

## **METHODOLOGY:**

### **Study Design :**

This was a cross sectional study.

### **Sampling Method :**

This study involves convenient sampling.

### **Sample Size :**

Fifty patients attending diabetology out patient department.

### **Sample Recruitment :**

Patients attending diabetology out patient department with a diagnosis of type 2 diabetes mellitus with no other major medical complications.

## **Inclusion Criteria :**

F0
B1

 Patients with diagnosis of diabetes mellitus more than 5 years.

F0
B1

 Patients in age group between 30 years to 50 years.


F0
B1


 Those who were willing for consent.


F0
B1


 Both males and females.

## **Exclusion Criteria :**

 Patients with diagnosis of psychiatric illness and treatment.

 Juvenile onset diabetes mellitus.

 Patients with diagnosis of mental retardation.

 With any other major medical illness except systemic hypertension and dyslipidemia.

## **Materials Used in the study :**

- I. Patient proforma
- II. Mini International Neuropsychiatric Interview Scale  
(M.I.N.I)
- III. World Health Organisation Quality Of Life scale of BREF  
type (WHO QOL- BREF)

### **I. Patient proforma:**

Following details were collected with the use of this proforma,

- a) Socio-demographic profile of the patient.
- b) Age of onset of diabetes mellitus.
- c) Duration of diabetes mellitus.
- d) Type of diabetes mellitus.
- e) Type of treatment for diabetes mellitus.
- f) Duration of treatment for diabetes mellitus.
- g) Adherence to medication, diet and physical activity.
- h) Weight.

- i) Most recent blood sugar levels.
- j) Most recent HbA1C.
- k) Co-morbid dyslipidemia.

Reference range for blood sugar levels were based on guidelines from American Diabetic Association :

Elevated blood sugar levels-

- FBS > 126 mg/dl
- PPBS > 200 mg/dl
- HbA1C > 6.5 mg/dl

## **II. Mini International Neuropsychiatric Interview scale (M.I.N.I)**

We employed the M.I.N.I English version 5.0.0 in our study to assess the existence of psychiatric co morbidities among our sample group of patients. The M.I.N.I was first developed with a view of efficient and accurate assessment of DSM IV psychiatric disorders (87) .



The M.I.N.I is a brief structured interview for the major Axis I psychiatric disorders in DSM IV and ICD-10. The interview has very precise questions regarding psychological problems requiring a yes or no answer.

The M.I.N.I is divided into modules identified by letters, each corresponding to a diagnostic category. Validation and reliability studies have been done comparing the M.I.N.I to the SCID-P and the CIDI. These studies yielded results that revealed M.I.N.I to have acceptably high validation and reliability scores.

The added advantage being that the M.I.N.I. can be administered in a much shorter period of time ( mean 18.7 +/- 11.6 min., median 15 min. ) than the SCID-P and the CIDI.

### **III. World Health Organization Quality Of Life scale of BREF type (WHO QOL-BREF)**

While the WHOQOL-100 was helpful in the detailed assessment of each individual facet with regard to quality of life, it however was too lengthy for practical use under certain circumstances. To overcome this practical difficulty WHOQOL-BREF was developed to enable the assessment of quality of life in a short form. Domain level profiles are developed using data from the pilot WHOQOL assessment and Field trial Version of the WHOQOL-100.

WHOQOL-BREF has a total of 26 questions. In order to have a broad and comprehensive assessment, one item from each of 24 facets of the WHOQOL-100 has been included. In addition two items from the Overall Quality of Life and General Health facet have been included.

WHO QOL-BREF includes 4 domains such as :

1. Physical health
2. Psychological

### 3. Social relationships

### 4. Environment

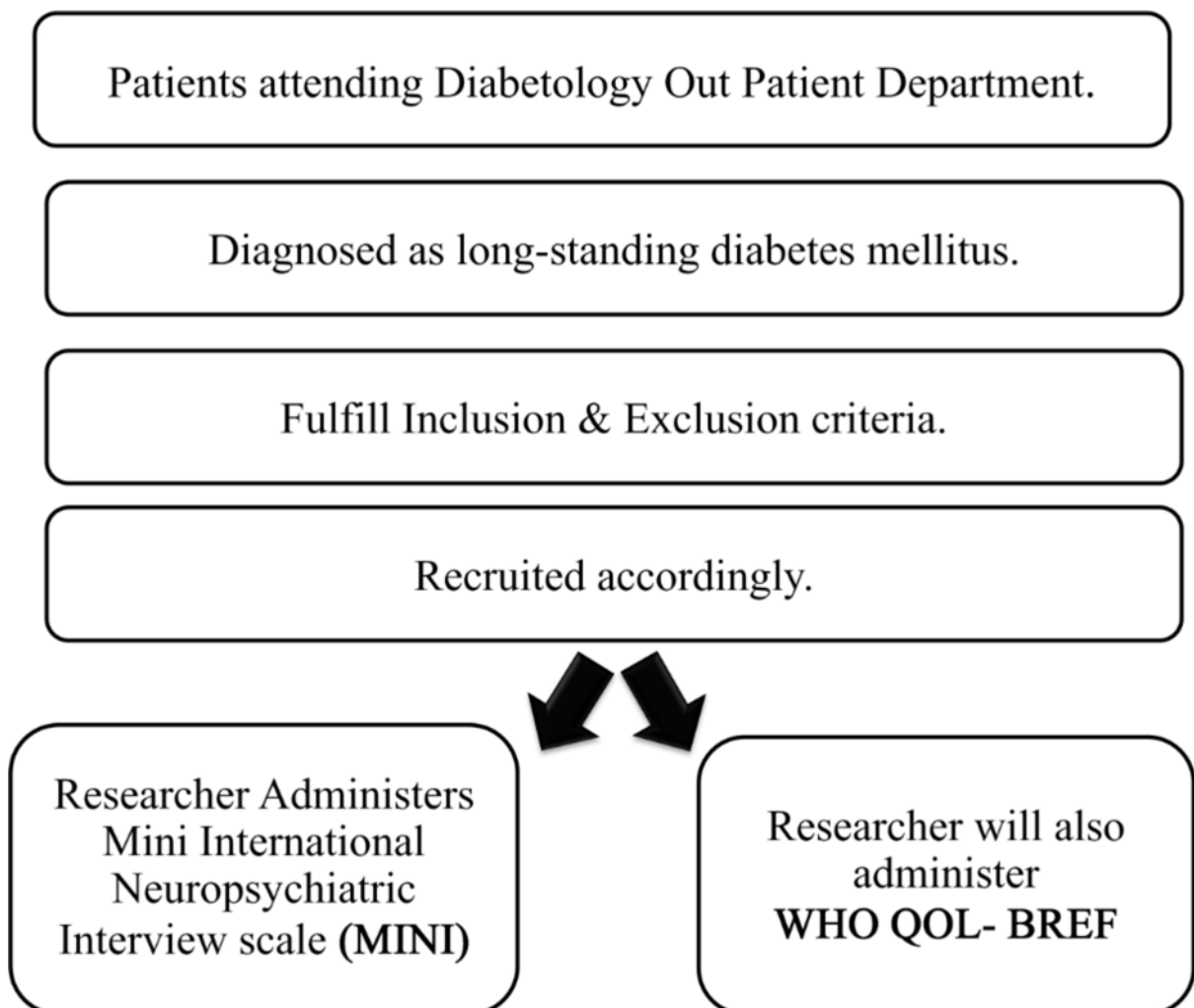
From the above domains it is possible to derive four domain scores which provide an individual's perception of quality of life in each of the domain .There are also two items examined separately: Question 1 assesses individual's overall perception of quality of life and Question 2 assesses individual's overall perception of health.

The domain scores are scaled in a positive direction (i.e. higher scores denote higher quality of life).The mean score of item in each domain will help to calculate the overall domain score. The mean scores are multiplied by 4 in order to make domain scores comparable with the scores used in WHOQOL-100.

We converted the raw scores to transformed scores using the second transformation method wherein domain scores are converted to a scale of 0-100.It is expected that in the future WHOQOL-100 and WHOQOL-BREF will be useful in health policy research and will be a part of routine auditing of health and social services.

As the instrument was developed cross-culturally, health care providers, administrators and legislators in countries that do not have a validated quality of life measures currently, could use data yielded from work involving WHOQOL assessments which will be genuinely sensitive to their setting.

**Fig 1; Flowchart showing methodology**



## **ANALYSES :**

Data were entered in the excel sheet and statistical analyses were carried out using the software SPSS (IBM SPSS - Statistical Product and Service Solutions, version 19.0).

We had used descriptive statistics to get the mean and standard deviation of variables like age, onset of diabetes, duration of diabetes, duration of treatment and weight of the participants.

Other descriptive variables such as gender, marital status, social economic status, type of treatment, adherence to medications, adherence to diet, adherence to physical exercise, fasting blood sugar, post prandial blood sugar, Glycosylated haemoglobin and dyslipidemia were expressed in percentages.

Association of quality of life with fasting blood sugar, post prandial blood sugar, glycosylated haemoglobin and dyslipidemia were analysed using independent t test.

Chi-Square test was used to assess the association between psychiatric co-morbidities and other quantitative variables. Correlation between age, age of onset of diabetes, duration of diabetes, duration of treatment to psychiatric co-morbidities were assessed using pearson's correlation test.

## **RESULTS:**

1. Baseline profile of the study sample
2. Prevalence of psychiatric co morbidities in diabetic individuals assessed by M.I.N.I.
3. Association of various clinical and treatment variables in individuals with diabetes mellitus and its impact on quality of life assessed by WHOQOL-BREF.

Our study population consisted of 50 subjects who had fulfilled the inclusion criteria.

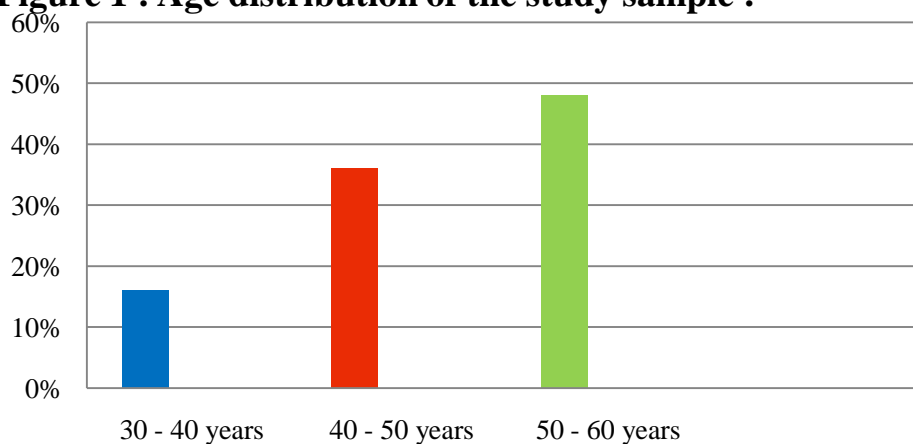
### **BASELINE PROFILE:**

#### **Baseline Socio demographic details of the study sample :**

##### **Age:**

Among the study sample , 48 % (n=24) of subjects belonged to the 50- 60 years age group , 36 % (n=18) belonged to the 40 - 50 years age group and 16% (n=8) belonged to the 30 - 40 years age group.

**Figure 1 : Age distribution of the study sample :**



**Table 1: Mean age of the study sample :**

Study Group (N=50)	MEAN $\pm$ SD
Age	49.46 $\pm$ 8.4

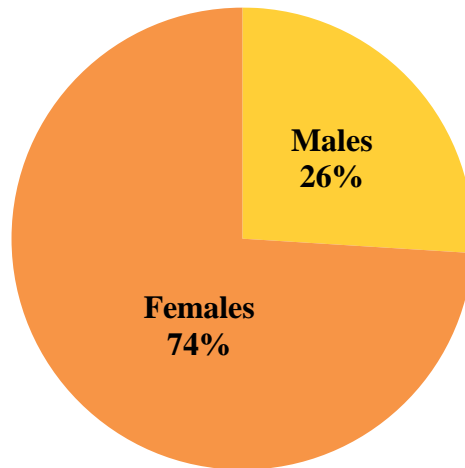
The mean age of our study sample was 49.46 years (SD - 8.406) .

### **Gender :**

The study population had a majority of females 74 % (n=37) and males constituted 26 % (n=13) .



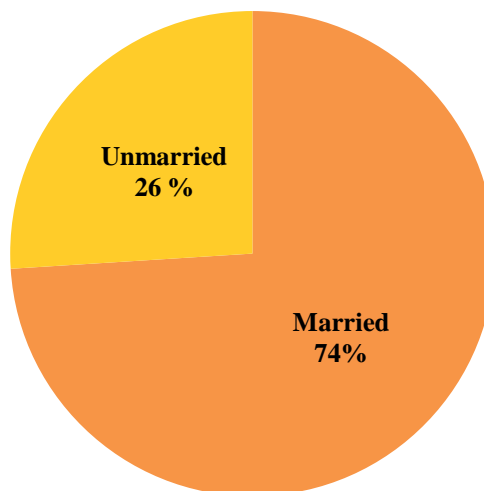
**Figure 2 : Sex Distribution of the Study Sample :**



**Marital status :**

Most of the participants were married 94% (n=47)

**Figure 3 : Marital distribution of the study sample :**



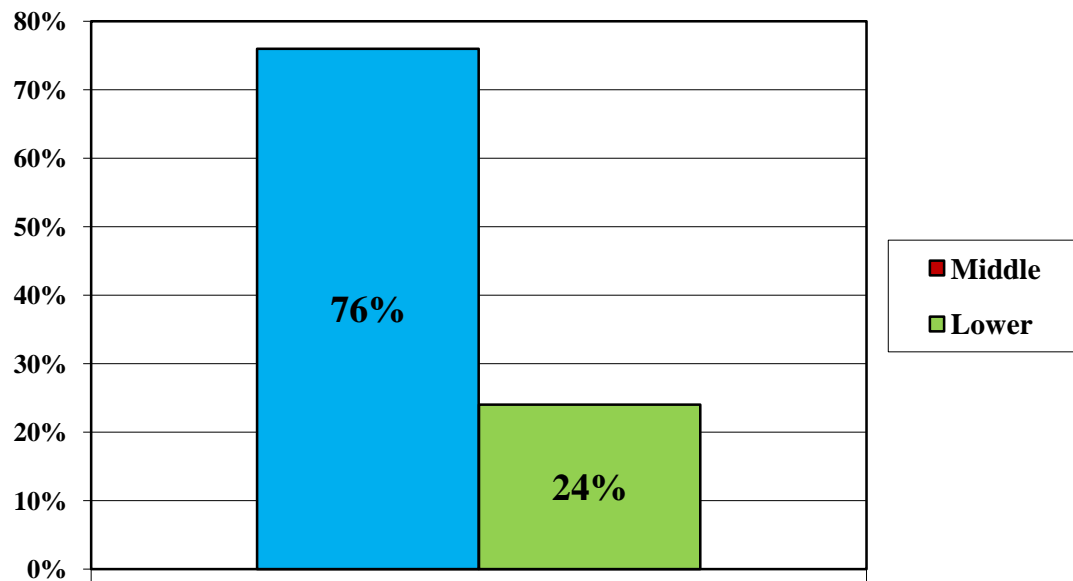
**Table 2 : Marital status of the study sample :**

Marital status	Frequency	Percent (%)
Married	13	26.0
Unmarried	37	74.0

**Socio-Economic Status :**

76 % of participants were from middle socioeconomic status where as participants from low socioeconomic status were 24% of the entire sample.

**Figure 4 : Distribution of Socio economic status of study sample:**



**Table 3 : Socio economic status of the study sample :**

Socio economic status	Frequency	Percent (%)
Middle	38	76.0
Lower	12	24.0
Total	50	100.0

**Age of onset of diabetes mellitus:**

The mean age of onset of diabetes mellitus was  $39.48 \pm 7.3$  years .

**Duration of diabetes mellitus :**

The duration of diabetes mellitus showed a mean of 10.06  $\pm$  5.1 years in the study population .

**Table 4: Mean diabetes onset and duration of the study:**

<b>Study Group (N=50)</b>	<b>MEAN <math>\pm</math> SD</b>
<b>Diabetes onset</b>	39.48 $\pm$ 7.3
<b>Diabetes duration</b>	10.06 $\pm$ 5.1

**Baseline treatment variables of the study sample:****Type of treatment:**

Among the 50 participants diagnosed with diabetes mellitus, 90% of them were on anti diabetic agents, 4% were on insulin therapy and 6% were on combination of both insulin therapy and oral anti diabetic medications.

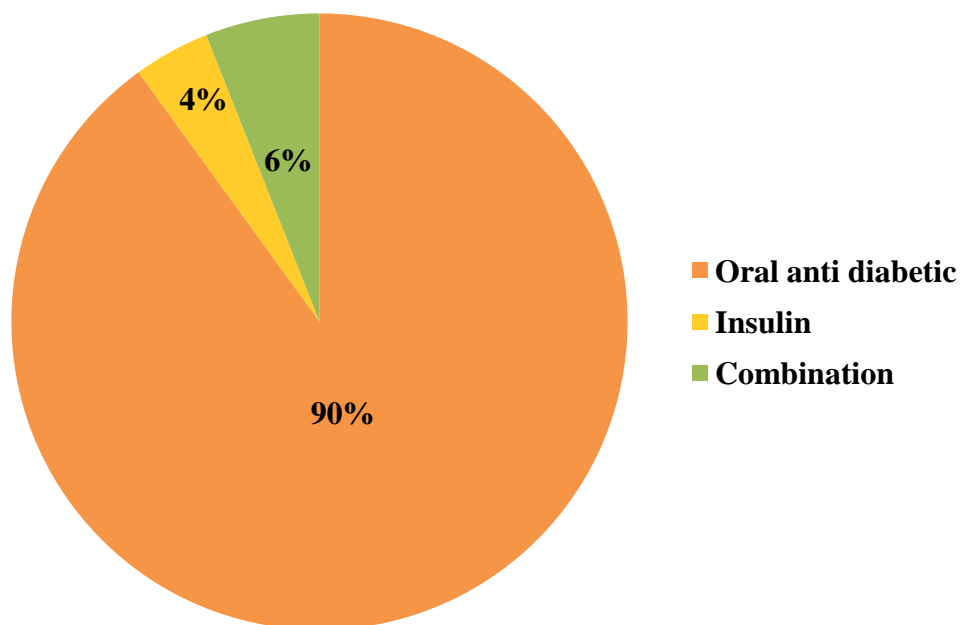
### Duration of treatment :

The mean duration of treatment in the study participants was  $9.14 \pm 4.6$  years.

**Table 5: Treatment status of the study :**

Treatment status	Frequency	Percent (%)
Oral Anti diabetic drug	45	90.0
Insulin	2	4.0
Combination therapy	3	6.0

**Figure 5 : Treatment distribution of the study sample :**



**Table 6: Mean treatment duration of the study sample :**

<b>Study Group (N=50)</b>	<b>MEAN± SD</b>
<b>Treatment Duration</b>	9.14±4.6

**Adherence to medication :**

In the study population majority 96% (n=48) were regularly adherent to the medications where as only a meagre 4% (n=2) were non-adherent.

**Adherence to diet :**

With respect to diet ,most of the participants 64% (n=32) were strictly adherent to diabetic diet in contrast to 46% who were not adherent to strict dietary practices.

**Adherence to physical activity:**

Among these 50 participants , 56% (n=28) of them were following some form of regular physical activities whereas 44 % (n=22) were either not following any form of physical activity or were irregular

**Table 7 : Adherence to medication and life style modification of the study sample**

	<b>Adherence</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Medication</b>	Adherent	48	96.0
	Non - adherent	2	4.0
<b>Diet</b>	Adherent	32	64.0
	Non-adherent	18	36.0
<b>Physical activity</b>	Adherent	28	56.0
	Non-adherent	22	44.0

**Body weight :**

The mean body weight of the study population was  $64.15 \pm 12.1$ .

**Table 8: Mean Weight of the study sample :**

<b>Study Group (N=50)</b>	<b>MEAN± SD</b>
Mean Weight	64.15±12.1

**Glycemic Profile :**

**Fasting blood sugar:**

Among 50 participants majority 72 % (n=36) had Fasting Blood Sugar levels within normal limits whereas in 28 % (n=14) the levels were elevated.

**Postprandial blood sugar :**

The postprandial blood sugar levels were also within normal limits in most of the participants 64 % (n=32) .

**HbA1C level :**

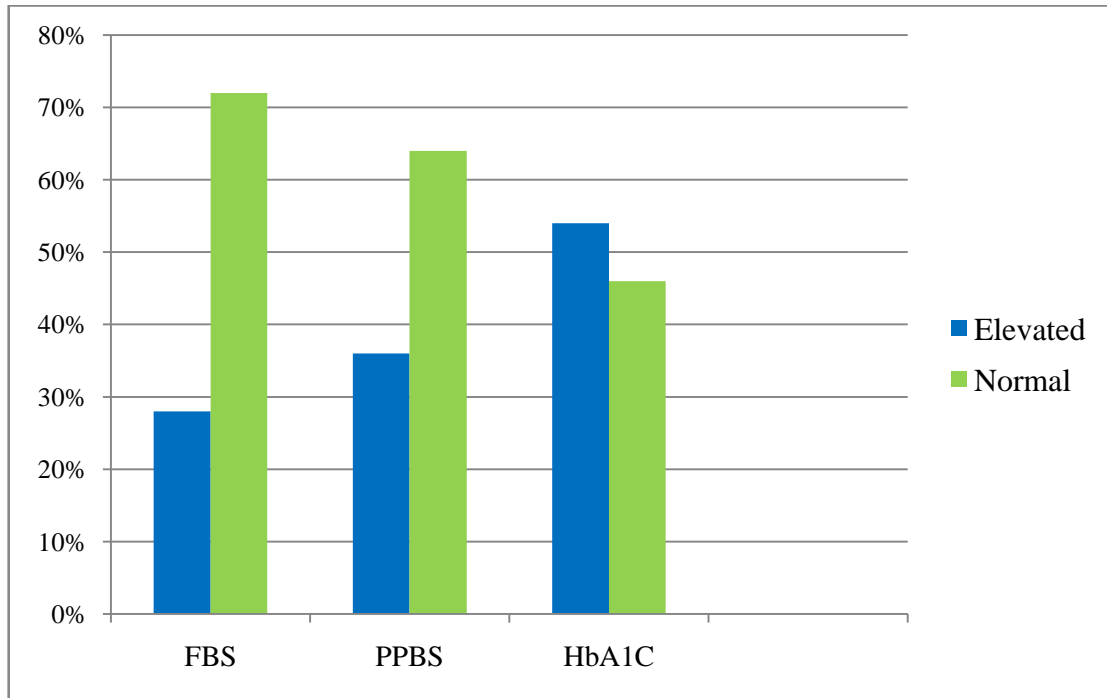
On estimating HbA1C levels while 46 % (n=23) had a tight glycemic control, 54% (n=27) did not have a favourable glycemic control.



**Table 9 : Glycemic profile of the study sample :**

	<b>Levels</b>	<b>Frequency (N=50)</b>	<b>Percentage (%)</b>
<b>Fasting Blood Sugar</b>	<b>Elevated</b>	14	28.0
	<b>Normal</b>	36	72.0
<b>Post Prandial Blood Sugar</b>	<b>Elevated</b>	18	36.0
	<b>Normal</b>	32	64.0
<b>HbA1C</b>	<b>Elevated</b>	27	54.0
	<b>Normal</b>	23	46.0

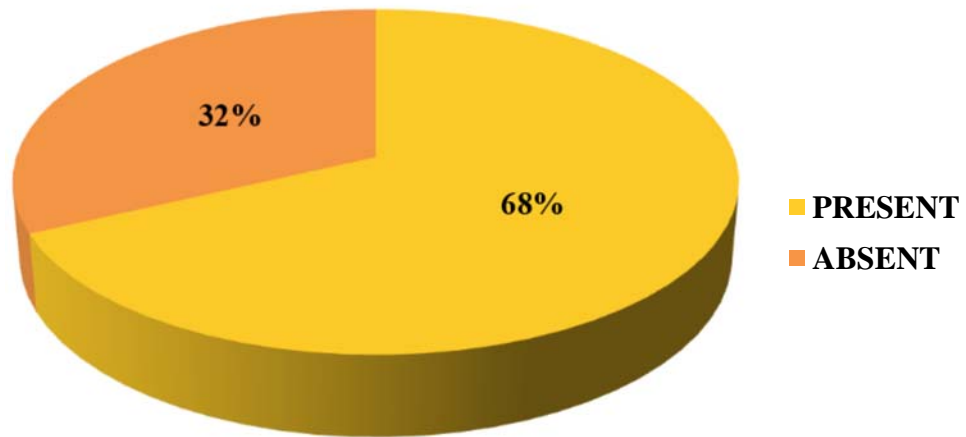
**Figure 6 : Glycemic profile of the study sample :**



**Co morbid Dyslipidemia :**

Dyslipidemia was found to occur more frequently among the study subjects amounting to 68 % (n=34) of the total.

**Figure 7 :Co morbid dyslipidemia of the study sample :**



**Table 10:Co morbid dyslipidemia of the study sample :**

Co morbid dyslipidemia	Frequency	Percent (%)
Present	34	68
Absent	16	32
Total	50	100

## EVALUATION OF PSYCHIATRIC CO MORBIDITIES - M.I.N.I.

In the study sample on administering M.I.N.I it was found that 8% (n=4) of the 50 diabetic subjects had psychiatric co morbidities, of which 4 % ( n=2) were found to have Major Depressive Episode with melancholia, 2% (n=1) had only Major Depressive Episode and another 2% (n=1) had Dysthymia.

**Table 11: Psychiatric co morbidities of the study sample :**

<b>Psychiatric co morbidities (M.I.N.I)</b>	<b>Frequency</b>	<b>Percent (%)</b>
None	46	92
Major Depressive Episode	1	2
Major Depressive Episode with Melancholia	2	4
Dysthymia	1	2
Total	50	100

### **Age and psychiatric co-morbidities:**

Age and psychiatric co morbidities had a correlation coefficient with R value of 0.06 and P value of 0.67 which was not significant.

**Table 12 : Correlation of age with Psychiatric co-morbidities of the study sample :**

<b>Parameter</b>	<b>Psychiatric co morbidities</b>	
	<b>R value</b>	<b>P value</b>
<b>Age</b>	0.061	0.674

### **Marital status and psychiatric co-morbidities:**

Among the married subjects 91.5 % (n=43) had no psychiatric co morbidities, 2.1 % (n=1) had major depressive episode, 4.3 % (n=2) had major depressive episode with melancholia and 2.1 % (n=1) had dysthymia. P value was 0.96 which was not significant.

**Table 13: Psychiatric co morbidities and marital status of the study sample**

Marital Status	PSYCHIATRIC CO-MORBIDITIES				P Value
	None	Major depressive episode	Major depressive episode with melancholia	Dysthymia	0.964
Married	43(91.5%)	1(2.1%)	2(4.3%)	1(2.1%)	
Unmarried	3(100%)	0(0%)	0(0%)	0(0%)	

**Socio economic status and psychiatric co-morbidities :**

In the middle socio economic status, 89.5 % (n=34) had no psychiatric co morbidities, 2.6 % (n=1) had Major depressive episode, 5.3% (n=2) had Major depressive episode with melancholia and 2.6 % (n=1) had dysthymia.

P value was 0.71 which was not significant.

**Table 14: Psychiatric Co-Morbidities and Socio Economic Status of the study sample :**

Socio economic status	PSYCHIATRIC CO-MORBIDITIES				P Value
	None	Major depressive episode	Major depressive episode with melancholia	Dysthymia	0.712
Middle	34(89.5%)	1(2.6%)	2(5.3%)	1(2.6%)	
Low	12(100%)	0(0%)	0(0%)	0(0%)	

**Age of onset of diabetes mellitus and psychiatric co-morbidities:**

The age of onset of diabetes mellitus showed R value of 0.09.

P value was 0.50 which was not significant.

**Table 15 : Correlation of onset of diabetes with Psychiatry Co-Morbidities of the study sample :**

Parameter	Psychiatric co morbidities	
	R value	P value
Age of onset of diabetes	.096	.505

### **Duration of diabetes mellitus and psychiatric co-morbidities :**

The duration of diabetes and psychiatric co morbidities showed a correlation co efficient R value of 0.24 and P value of 0.08 was not significant.

**Table 16 : Correlation of duration of diabetes with Psychiatric co morbidities of the study sample :**

<b>Parameter</b>	<b>Psychiatric co morbidities</b>	
	<b>R value</b>	<b>P value</b>
<b>Duration of diabetes</b>	.243	.089

### **Treatment of diabetes mellitus and psychiatric co morbidities:**

Among individuals on oral anti-diabetic agent 93.3 % (n=41) had no psychiatric co morbidities, 2.2 % (n=1) had Major depressive episode, 2.2 % (n=1) had Major depressive episode with melancholia another 2.2 % (n=1) had dysthymia. Whereas among those on insulin therapy 50 % (n=1) had no psychiatric co morbidities and 50 % (n=1) had Major depressive episode with melancholia.



Those who were on a combination of both treatments showed no psychiatric co morbidities in all 100 % (n=3).P value was 0.89 which was insignificant

**Table 17: Psychiatric co-morbidities and treatment status of the study sample:**

Treatment	PSYCHIATRIC CO-MORBIDITIES				P Value
	None	Major depressive episode	Major depressive episode with melancholia	Dysthymia	
Oral Anti diabetic	42(93.3%)	1(2.2%)	1(2.2%)	1(2.2%)	0.891
Insulin	1(50%)	0(0%)	1(50%)	0(0%)	
Combination	3(100%)	0(0%)	0(0%)	0(0%)	

**Adherence to medications and psychiatric co-morbidities :**

Among those adherent to medications 91.7 % (n=44) had no psychiatric co morbidities, 2.1 % (n=1) had Major depressive episode,

2.1% (n=1) had dysthymia however 100 % (n=2) who were not adherent to treatment had no psychiatric co morbidities.

P value was 0.98 which did not prove to be significant.

**Table 18: Psychiatric Co-Morbidities and Medication adherence status of the study sample:**

Medication	PSYCHIATRIC CO-MORBIDITIES				P Value
	None	Major depressive episode	Major depressive episode with melancholia	Dysthymia	0.981
Adherent	44(91.7%)	1(2.1%)	2(4.2%)	1(2.1%)	
Non-Adherent	2(100%)	0(0%)	0(0%)	0(0%)	

#### **Adherence to diet and psychiatric co-morbidities :**

It was observed that in those adherent to diabetic dietary practices psychiatric co morbidities were absent in 93.8 % (n=30), Major depressive episode was seen in 3.1 % (n=1) and Major depressive episode with melancholia was seen in 3.1 % (n=1) and none had dysthymia.

Among those not adherent to strict diabetic dietary practices there was no psychiatric co morbidities in 88.9 % (n=16) Major depressive episode with melancholia in 5.6 % (n=1) and dysthymia in 5.6 % (n=1).

P value was 0.468 which was not significant.

**Table 19: Psychiatric co-morbidities and adherence to diet of the study sample**

Diet	PSYCHIATRIC CO-MORBIDITIES				P Value
	None	Major depressive episode	Major depressive episode with melancholia	Dysthymia	
Adherent	30(93.8%)	1(3.1%)	1(3.1%)	0(0%)	0.468
Non-Adherent	16(88.9%)	0(0%)	1(5.6%)	1(5.6%)	

### **Adherence to physical activity and psychiatric co-morbidities :**

It was observed that in those adherent to regular physical activity, psychiatric co morbidities were absent in 92.9 % (n=26), Major depressive episode was seen in 3.6 % (n=1) and Major depressive episode with melancholia was seen in 3.6 % (n=1) and none had dysthymia. Among those not adherent to regular physical activity there was no psychiatric co morbidities in 90.9 % (n=20), Major depressive episode with melancholia in 4.5 % (n=1) and dysthymia in 4.5 % (n=1).

P value was 0.55 which was not significant.

**Table 20: Psychiatry Co-Morbidities and adherence to Physical activity of the study sample :**

Physical activity	PSYCHIATRIC CO-MORBIDITIES				P Value
	None	Major depressive episode	Major depressive episode with melancholia	Dysthymia	
Adherent	26(92.9%)	1(3.6%)	1(3.6%)	0(0%)	0.553
Non-Adherent	20(90.9%)	0(0%)	1(4.5%)	1(4.5%)	

### **Duration of treatment and Psychiatric co morbidities :**

Duration of treatment showed a correlation coefficient R value of 0.25 .

P value of 0.07 which was insignificant.

**Table 21 : Correlation of duration of treatment with Psychiatric co-morbidities of the study sample :**

Parameter	Psychiatric co morbidities	
	R value	P value
Duration of treatment	.256	.073

### **Glycemic profile and psychiatric co-morbidities :**

In the subset in whom fasting blood sugar was elevated 100 % (n=14) had no psychiatric co morbidities .Whereas in those in whom fasting blood sugar was normal,88.9 % (n=32) had no psychiatric co morbidities , however 2.8 % (n=1) had Major depressive episode and 5.6 % (n=2) had Major depressive episode with melancholia and another 2.8 % (n=1) had dysthymia.

On observing Postprandial blood sugar values it was found that among those with elevated levels 88.9% (n=16) had no psychiatric co morbidities, 5.6 % (n=1) had Major depressive episode and 5.6 % (n=1) had Major depressive episode with melancholia. Among those who had normal postprandial blood sugar levels while 93.8 % (n=30) had no psychiatric co morbidities, 3.1 % (n=1) had Major depressive episode with melancholia and another, 3.1 % (n=1) had dysthymia.

With respect to HbA1C, 26 % (n=96.3) of those with elevated levels had no psychiatric co morbidities and 3.1 % with elevated values (n=1) had Major depressive episode.

Among those with normal values, 87 % (n=20) had no psychiatric co morbidities, 8.7% (n=2) had Major depressive episode with melancholia and 4.3% (n=1) had dysthymia P value for fasting blood sugar, post prandial blood sugar and HbA1c was 0.63, 0.46 and 0.21 respectively all of which showed no significance.

**Table 22: Psychiatric co morbidities and glycemic profile of the study**

**sample :**

	PSYCHIATRIC CO MORBIDITIES					P Value
		None	Major depressive episode	Major depressive episode with melancholia	Dysthymia	
Fasting Blood Sugar	Elevated	14(100%)	0(0%)	0(0%)	0(0%)	0.639
	Normal	32(88.9%)	1(2.8%)	2(5.6%)	1(2.8%)	
Post Prandial Blood Sugar	Elevated	16(88.9%)	1(5.6%)	1(5.6%)	0(0%)	0.468
	Normal	30(93.8%)	0(0%)	1(3.1%)	1(3.1%)	
HbA1C	Elevated	26(96.3%)	1(3.7%)	0(0%)	0(0%)	0.213
	Normal	20(87.0%)	0(0%)	2(8.7%)	1(4.3%)	

### **Co existing dyslipidemia and psychiatric co-morbidities :**

Of the study participants in those with co morbid dyslipidemia 97.1 % (n=33) had no psychiatric co morbidities whereas 2.9 % (n=1) had Major depressive episode.

Among those with normal lipid profile 81. 3% (n=13) had no psychiatric co morbidities whereas 6.3 % (n=1) had dysthymia. P value was 0.06 which was insignificant.

**Table 24: Psychiatric Co morbidities and dyslipidemia of the study sample**

Dyslipidemia	PSYCHIATRIC CO-MORBIDITIES				P Value
	None	Major depressive episode	Major depressive episode with melancholia	Dysthymia	
Elevated	33(97.1%)	1(2.9%)	0(0%)	0(0%)	0.068
Normal	13(81.3%)	0(0%)	2(12.5%)	1(6.3%)	



**Association of clinical and treatment variables of diabetes mellitus and its impact on quality of life :**

The glycemc profile and co existing dyslipidemia were assessed in accordance to the four domains (Physical , Psychological, Social ,Environmental ) as per the WHOQOL-BREF, which in turn revealed the impact of the clinical and treatment variables on the quality of life.

**TABLE 24: Association of Quality of life with Fasting blood sugar:**

Quality of life	Fasting blood sugar	MEAN $\pm$ SD	P value
Physical	Elevated	57.71 $\pm$ 5.8	0.482
	Normal	59.9 $\pm$ 8.1	
Psychological	Elevated	57.64 $\pm$ 7.9	0.377
	Normal	60.03 $\pm$ 8.7	
Social	Elevated	67.50 $\pm$ 9.2	0.644
	Normal	68.67 $\pm$ 7.4	
Environmental	Elevated	64.14 $\pm$ 7.4	0.360
	Normal	66.19 $\pm$ 6.8	

### **Fasting blood sugar and Quality of life :**

In the domain of Physical health fasting blood sugar was in the normal range in a majority of the subjects with a mean of  $59.39 \pm 8.054$  and elevated among a mean of  $59.39 \pm 5.7$  .

The P value was 0.48 which did not show any significance.

In the domain of Psychological health, normal levels were observed in a mean of  $60.03 \pm 8.7$  and higher values among a mean of  $57.64 \pm 7.8$ .

The P value was 0.37 which was not significant.

The domain of social health showed that most individuals had fasting blood sugar values within normal with a mean of  $68.67 \pm 7.4$  and a mean of  $67.50 \pm 9.2$  had elevated levels.

The P value was 0.64 and did not prove to be significant.

In relation to the environmental health domain, individuals had normal levels in a mean of  $66.19 \pm 6.8$  whereas a mean of  $64.14 \pm 7.4$  had values outside the preferred range.

P value was 0.36 which was insignificant

### **Post prandial blood sugar and Quality of life :**

In the domain of Physical health postprandial blood sugar was in the normal range in a majority of the subjects with a mean of  $61.13 \pm 6.3$  and elevated among a mean of  $55.00 \pm 7.9$  .

The P value of 0.04 showed significance.

In the domain of Psychological health, normal levels were observed in a mean of  $61.47 \pm 7.7$  and higher values among a mean of  $55.61 \pm 8.5$ .

The P value was 0.01 that proved to be significant.

The domain of social health showed that most individuals had postprandial blood sugar values within normal with a mean of  $69.81 \pm 6.0$  and a mean of  $65.72 \pm 10.1$  had elevated levels.

The P value was 0.07 and did not prove to be significant.

In relation to the environmental health domain, individuals had normal levels in a mean of  $67.00 \pm 6.6$  whereas a mean of  $63.17 \pm 7.2$  had values outside the preferred range. P value was 0.06 which was insignificant.

**TABLE 25: Association of Quality of life with Post Prandial blood sugar :**

Quality of life	Fasting blood sugar	MEAN $\pm$ SD	P value
Physical	Elevated	55.0 $\pm$ 7.9	<b>0.040</b>
	Normal	61.13 $\pm$ 6.3	
Psychological	Elevated	55.61 $\pm$ 8.5	<b>0.017</b>
	Normal	61.47 $\pm$ 7.8	
Social	Elevated	65.72 $\pm$ 10.1	0.079
	Normal	69.81 $\pm$ 6.0	
Environmental	Elevated	63.17 $\pm$ 7.2	0.064
	Normal	67.00 $\pm$ 6.6	

## **HbA1C and Quality of life :**

The HbA1C, a measure of the glycemic control in patients was observed in relation to all the four domains.

In the domain of Physical health HbA1C was in the normal range subjects with a mean of  $59.70 \pm 5.8$  and elevated among a mean of  $58.26 \pm 8.6$ .

The P value of 0.50 did not show any significance.

When considering the domain of Psychological health, normal levels were observed in a mean of  $59.91 \pm 8.4$  and higher values among a mean of  $58.89 \pm 8.5$ .

The P value was 0.67 that proved to be insignificant.

The social health domain showed that most individuals had HbA1c levels within normal limits in whom the mean was  $68.83 \pm 6.617$  and a mean of  $67.93 \pm 8.957$  had elevated levels

The P value was 0.692 and did not prove to be significant.

In relation to the environmental health domain, individuals had normal levels in a mean of  $67.30 \pm 7.302$  whereas a mean of  $64.19 \pm 6.593$  had values outside the preferred range.

P value was 0.119 which was insignificant.

**TABLE 26: Association of quality of life with HbA1C**

Quality of life	Fasting blood sugar	MEAN $\pm$ SD	P value
Physical	Elevated	$58.26 \pm 8.7$	0.503
	Normal	$59.70 \pm 5.8$	
Psychological	Elevated	$58.89 \pm 8.6$	0.675
	Normal	$59.91 \pm 8.5$	
Social	Elevated	$67.93 \pm 8.9$	0.692
	Normal	$68.83 \pm 6.6$	
Environmental	Elevated	$64.19 \pm 6.6$	0.119
	Normal	$67.30 \pm 7.3$	

### **Dyslipidemia and Quality of life:**

In the domain of Physical health dyslipidemia was observed in a mean of  $58.65 \pm 7.6$  and levels were normal among a mean of  $59.50 \pm 7.3$ .

The P value Of 0.710 did not show any significance.

When considering the domain of Psychological health, dyslipidemia was found in a mean of  $58.91 \pm 8.5$  and normal values among a mean of  $60.31 \pm 8.5$ .

The P value was 0.59 that proved to be insignificant.

The social health domain showed that dyslipidemia had a mean of  $67.76 \pm 8.2$  whereas a mean of  $69.5 \pm 7.2$  had no associated dyslipidemia.

The P value was 0.45 and did not prove to be significant.

In relation to the environmental health domain, individuals had dyslipidemia in a mean of  $64.03 \pm 7.2$  whereas a mean of  $69.00 \pm 5.3$  had values outside the preferred range.

P value was 0.01 which was found to be significant.

**TABLE 27: Association of Quality of life with Dyslipidemia :**

Quality of life	Dyslipidemia	MEAN $\pm$ SD	P value
Physical	Elevated	$58.65 \pm 7.7$	0.710
	Normal	$59.50 \pm 7.3$	
Psychological	Elevated	$58.91 \pm 8.6$	0.591
	Normal	$60.31 \pm 8.6$	
Social	Elevated	$67.76 \pm 8.3$	0.459
	Normal	$69.56 \pm 7.3$	
Environmental	Elevated	$64.03 \pm 7.2$	<b>0.018</b>
	Normal	$69.00 \pm 5.4$	



## **DISCUSSION:**

Ours was a cross sectional study to evaluate the prevalence of psychiatric comorbidities in patients with long standing diabetes mellitus attending diabetology out patient department.

In addition to that, we also assessed the impact of glycemic control on psychiatric comorbidities . The relationship between diabetes mellitus and various domains of quality of life were assessed.

We had recruited 50 participants ,of whom 26% were males and 74% were females with a mean age of 49.46 years. Among them ,94% were married and 76% belonged to middle socioeconomic status.

Participants had diabetes mellitus for a mean duration of 10.06 years (SD -5.101) with mean age of onset being 39.48 years (SD-7.302). Study group had a mean body weight of 64.15 (SD-12.062).

Considering the type of treatment, 90% were on oral antidiabetic agents whereas 6% were on insulin therapy. Around 4 % were in need of both oral antidiabetic medications and insulin therapy.

We also assessed their adherence to medication, diet and regular physical exercise. Results showed that 96% were adherent to medications while 64% were adherent to strict diabetic diet. Only 56% were strictly practicing regular physical activities .

**With regards to adherence of participants to various methods of glycemic control, adherence was more to pharmacological methods of treatment rather than life style modifications.**

Among the measures for life style modification they were found to be more adherent with diet (64%) practices than physical activities (56%).

On considering type of treatment and adherence to the medications, almost 100% of the participants were on one or other form

of diabetic medications. However, as far as adherence was concerned, there was a decline to about 90%.

**Our results reveal that there was a decline in adherence to medication inspite of being treated with one or other form of anti diabetic medications.**

Participants were found to have a mean weight of  $64.15 \pm 12.1$ .

On analysing the glycemic profile, results showed that fasting blood sugar was normal in 72% of the population, while postprandial sugar level was normal in 64% . While assessing the strict glycemic control, HbA1c was analysed which turned out to be normal in 46% .

Dyslipidemia coexisting with diabetes was found in 25% of the study population.

Our study was to assess the prevalence of psychiatric comorbidities for the purpose of which a validated tool - The MINI scale was administered.

MINI :

In our study, the prevalence psychiatric comorbidities was 8%, while the remaining 92% did not have any psychiatric disorders .

Our analysis revealed that 4 % ( n=2) had Major Depressive Episode with melancholia, 2% (n=1) had only Major Depressive Episode either currently or in the past and another 2% (n=1) had Dysthymia currently according to MINI.

From the results, it was evident that all of those who had psychiatric disorders were females, all of them being married with a mean age of 44.25 years (SD-12.15).

## **CORRELATION OF PSYCHIATRIC COMORBIDITIES WITH THAT OF SOCIODEMOGRAPHIC VARIABLES:**

Correlation of various variables with that of psychiatric co morbidities was analysed. A positive correlation between age and psychiatric co morbidities with an R value of 0.061 was observed.

Onset of diabetes mellitus had a positive correlation with that of psychiatric comorbidities with a R value of 0.096.

Psychiatric co morbidity also shows a positive correlation with that of duration of onset of diabetes. (R value =0.243).

Duration of diabetes mellitus was positively correlated with that of psychiatric co morbidities. (R value =0.256)

## **ASSOCIATION OF CLINICAL AND TREATMENT VARIABLES OF DIABETES AND IMPACT ON QUALITY OF LIFE :**

Several studies have shown a relation of glycemic control and the co existing dyslipidemia to quality of life. Hence in addition to evaluation of prevalence of psychiatric co morbidities, the relationship of glycemic profile in accordance to various domains of WHOQOL-BREF were also assessed .

The association of four domains (Physical , Psychological, Social , Environmental) of WHOQOL-BREF with that of glycemic profile and coexisting dyslipidemia was analysed.

In the domain of physical health ,fasting blood sugar levels were within normal limits and in terms of association between them, there was no statistical significance( $p=0.482$ ). Similarly, with respect to other domains of psychological health, social health and environmental health in relation to the fasting blood sugar level there was no statistical significance with a p value of 0.377, 0.644, 0.360 respectively.

From our results there was no statistically significant association between all four domains of WHOQOL-BREF with that of fasting blood sugar.

**Postprandial blood sugar levels were strongly associated with the domain of physical health which was found to be statistically significant ( $p=0.004$ ).**

**Similarly the domain of psychological health also had statistically significant association with postprandial blood sugar levels ( $p=0.017$ ).**

Other two domains of social and environmental health did not have any statistically significant association with that of postprandial blood sugar levels ( $p=0.079$  &  $0.064$  respectively).

Considering the association between the various domains of quality of life and HbA1c levels, there was no statistical significance. The p value of 4 domains are 0.50, 0.675, 0.692 & 0.119 respectively.

On analysing the association between dyslipidemia and quality of life there was a statistical significance in the domain of environmental health ( $p=0.018$ ).

### **Comparison With Other Studies :**

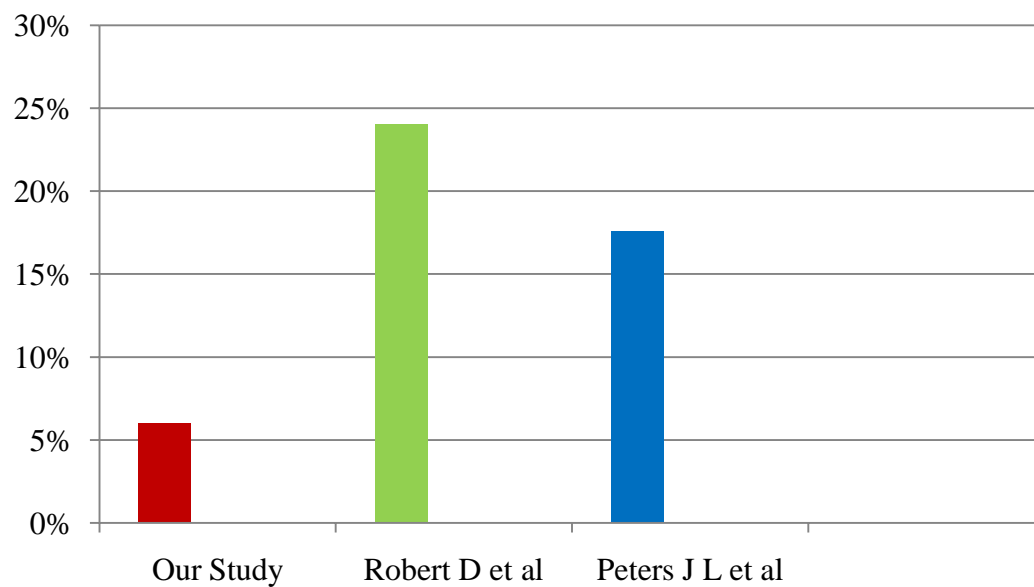
In a study performed by Robert D et al (33) the prevalence of depression among participants with diabetes mellitus was found to be 24 %, Peters JL et al (12) had observed the prevalence of depression among diabetics as 17.6%.Our study showed a prevalence of major depressive episode that was 2 % and major depressive episode with melancholia which was 4 %.

**Table 28 : Comparison of prevalence of depression with other studies :**

<b>Variable</b>	<b>Our Study</b>	<b>Robert D et al</b>	<b>Peter J L et al</b>
Prevalence Of depression	6 %	24 %	17.6 %



**Figure 8 : Comparison of prevalence of depression with other studies**



MINI scale used for assessing the prevalence of psychiatric co morbidities in our study has been used in previous studies done by Arthur et al (89) where a prevalence of 13.6 % had depression, 18.2 % had dysthymia and 22.7 % had generalised anxiety disorder and the same scale when used by Igwe M.N et al. (62) had revealed a prevalence of 27.8 % depression, 6.3 % suicidal behaviour and 1.1 % suicidal risk. This scale in our study reported a prevalence of 2 % major depressive episode, 4 % major depressive episode with melancholia and 2 % dysthymia.

**Table 29 : Comparison of psychiatric co morbidities - M.I.N.I :**

<b>Variable</b>	<b>Our study</b>	<b>Arthur et al</b>	<b>Igwe M.N et al</b>
Depression	6 %	13.6 %	27.8 %
Dysthymia	2 %	18.2 %	NA
Generalised Anxiety disorder	NA	22.7 %	NA
Suicidal behaviour	NA	NA	6.3 %
Suicidal Risk	NA	NA	1.1 %

According to the study by Robert D et al (33) diabetes had a larger impact on all the domains of Health related quality of life. In our study diabetes was found to have a statistically significant association in terms of Post prandial blood sugar levels in the domains of physical and psychological health and in the environmental domain of co existing dyslipidemia.

## **STRENGTHS AND LIMITATIONS :**

### **Strengths :**

- Tool used for assessment of psychiatric co-morbidities included various psychiatric disorders for evaluation.
- Our study has used standardized instruments for assessments.
- We assessed whether various sociodemographic variables and other parameters in relation with diabetes such as age of onset of diabetes, duration of diabetes, duration of treatment, type of treatment, adherence to treatment- diet- physical activity, fasting blood sugar, post prandial blood sugar and glycolated haemoglobin.
- We have also looked into the quality of life and its correlation with other variables.

- Our criteria was designed such that, individuals with any major medical complications along with daibets mellitus were excluded.

### **Limitations :**

- The sample size was small in our study. Future study can be done with larger sample size to look for correlation between various sociodemographic variables, diabetes and treatment variables to that of psychiatric manifestations.

## **CONCLUSION :**

Our study identifies the presence of psychiatric co-morbidities among individuals with long standing diabetes mellitus as in previous studies. In addition, the clinical and treatment variables of diabetes, might influence the development of psychiatric conditions as well as impair the health related quality of life, although it is of less significance in our study.

However, future research on a larger sample might provide a better understanding about the prevalence and the significance of association of the variables with the outcome. Such studies would help to assess the burden of psychiatric co morbidities due to long standing diabetes mellitus and the ensuing negative impact on the quality of life. This could help improve mental well being and the overall quality of life among patients with diabetes mellitus.

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